Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-197

DDG 1000 Zumwalt Class Destroyer (DDG 1000)

As of FY 2019 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

~~This document contains information that may be exempt from mandatory disclosure under the FOIA.~~

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Sensitivity Originator

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Common Acronyms and Abbreviations for MDAP Programs

Acq O&M - Acquisition-Related Operations and Maintenance
ACAT - Acquisition Category
ADM - Acquisition Decision Memorandum
APB - Acquisition Program Baseline
APPN - Appropriation
APUC - Average Procurement Unit Cost
$B - Billions of Dollars
BA - Budget Authority/Budget Activity
Blk - Block
BY - Base Year
CAPE - Cost Assessment and Program Evaluation
CARD - Cost Analysis Requirements Description
CDD - Capability Development Document
CLIN - Contract Line Item Number
CPD - Capability Production Document
CY - Calendar Year
DAB - Defense Acquisition Board
DAE - Defense Acquisition Executive
DAMIR - Defense Acquisition Management Information Retrieval
DoD - Department of Defense
DSN - Defense Switched Network
EMD - Engineering and Manufacturing Development
EVM - Earned Value Management
FOC - Full Operational Capability
FMS - Foreign Military Sales
FRP - Full Rate Production
FY - Fiscal Year
FYDP - Future Years Defense Program
ICE - Independent Cost Estimate
IOC - Initial Operational Capability
Inc - Increment
JROC - Joint Requirements Oversight Council
$K - Thousands of Dollars
KPP - Key Performance Parameter
LRIP - Low Rate Initial Production
$M - Millions of Dollars
MDA - Milestone Decision Authority
MDAP - Major Defense Acquisition Program
MILCON - Military Construction
N/A - Not Applicable
O&M - Operations and Maintenance
ORD - Operational Requirements Document
OSD - Office of the Secretary of Defense
O&S - Operating and Support
PAUC - Program Acquisition Unit Cost

PB - President's Budget
PE - Program Element
PEO - Program Executive Officer
PM - Program Manager
POE - Program Office Estimate
RDT&E - Research, Development, Test, and Evaluation
SAR - Selected Acquisition Report
SCP - Service Cost Position
TBD - To Be Determined
TY - Then Year
UCR - Unit Cost Reporting
U.S. - United States
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)

Program Information

Program Name
DDG 1000 Zumwalt Class Destroyer (DDG 1000)

DoD Component
Navy

Responsible Office

Capt. Kevin Smith
Program Executive Office Ships (PMS 500)
1333 Isaac Hull Ave. S.E. Stop 2202
Washington, DC 20376-2202

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Date Assigned: May 22, 2016

References

SAR Baseline (Development Estimate)
Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated November 23, 2005

Approved APB
Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated March 25, 2011

Mission and Description

After a comprehensive review of Zumwalt class requirements, the Navy decided in November 2017 to refocus the primary mission of the Zumwalt Class Destroyers from Land Attack to Offensive Surface Strike. This advanced warship will provide credible forward naval presence while operating independently or as an integral part of Naval, Joint, or Combined Expeditionary Strike Forces. Armed with an array of weapons, DDG 1000 will provide offensive, distributed, and precision firepower at long ranges in support of forces ashore. After a comprehensive review of Zumwalt class requirements, the Navy decided in November 2017 to refocus the primary mission of the Zumwalt Class Destroyers from Land Attack to Offensive Surface Strike.

Executive Summary

Program Highlights Since Last Report

The Zumwalt program continues to make significant progress in the construction, testing, and activation of the most complex class of surface combatants the Navy has ever constructed. The Navy and its industry partners have evaluated yard-wide workload and scheduling for all construction efforts and contracts, and continue to hold joint Navy and industry Flag-Level reviews to ensure that lessons learned on the first of class DDG 1000 are being fully leveraged to improve performance on the follow ships.

Bath Iron Works (BIW) delivered DDG 1000's (USS ZUMWALT) Hull, Mechanical, and Electrical (HM&E) systems to the Navy on May 20, 2016. Under the class-wide split delivery concept, DDG 1000 is currently undergoing Post Delivery Availability/Combat Systems Activation in San Diego, CA. In March 2017, DDG 1000 entered into an in-plant availability at the BAE Systems shipyard near Naval Base San Diego. The availability will complete in early 2018, to be followed by sea trials and combat systems acceptance trials with final delivery scheduled for December 2018.

Pre-Commissioning Unit Michael Monsoor (DDG 1001) is 98% complete. The ship was christened on June 18, 2016, and launched on June 20, 2016. Generator Light Off and Advanced Induction Motor Light Off were achieved in March and June 2017 respectively. Builder's trials commenced December 4, 2017 in Bath, ME. HM&E acceptance trials were completed in January 2018. HM&E delivery remains on track for March 2018.

Pre-Commissioning Unit Lyndon B. Johnson (DDG 1002) is 70% complete with all 94 units at land level on the BIW shipyard. Keel Lay was achieved on January 15, 2017 and the hull will be fully integrated in early 2018. BIW completed design of the DDG 1002 steel deckhouse and production is 77% complete.

Beginning in May 2018, the program will begin scheduled test and evaluation master plan (TEMP) events on the self defense test ship (SDTS).

After a comprehensive review of Zumwalt class requirements, the Navy decided in November 2017 to refocus the primary mission of the Zumwalt Class Destroyers from Land Attack to Offensive Surface Strike. The funding requested in PB 2019 will facilitate this change in mission and add lethal, offensive fires against targets afloat and ashore. These changes include integration of SM-6 capability, Maritime Strike Tomahawk Integration, and organic cryptologic collection equipment (SPECTRAL). In order to maintain the required radar signature, an upgrade in off-board platform communications to the Network Tactical Common Data Link (NTCDL) is also required.

The Advanced Gun Systems will remain on the ships, but in an inactive status for future use. Navy will continue to assess industry's gun launched guided projectile technology maturity for future consideration.

There are no significant software-related issues with this program at this time.

History of Significant Developments Since Program Initiation

History of Significant Developments Since Program Initiation	
Date	**Significant Development Description**
January 1995	The program achieved Milestone 0 and started the Cost and Operational Effectiveness Analysis for the surface combatant for the twenty-first century (SC 21), comprised of destroyers (DD 21) and cruisers (CG 21). The DD 21 was intended to replace the DDG 51 by providing advanced land attack and multi-mission capabilities.
January 1998	The program achieved Milestone I for DD 21 and proceeded into the Program Definition and Risk Reduction phase. Primary Milestone I risks identified were a ship with a new hull form, several new combat system elements, significantly reduced manning level, very low signatures, and at lower costs than DDG 51. In order to maintain competitive cost pressure and to maintain technical competition, the Navy awarded Phase I and II concept development contracts to two industry teams
November 2001	The DD 21 program was restructured into the DD(X) program.
April 2002	Phase II concept development concluded and the Navy competitively selected and awarded a Design and Development contract to Northrop Grumman (NG) Ship systems (now Huntington Ingalls Shipbuilding – HII). The NG team was subsequently expanded to a DD(X) "national" team that also included BIW, Lockheed Martin, and Boeing. The NG concept required Research, Development, Test, and Evaluation (RDT&E) increases for many of the new technologies including integrated electric drive, radars, software development, optimized manning, the advanced gun, and munitions. To reduce risk, the Navy contracted for Engineering Development Models (EDMs) for 10 subsystems.
January 2005	The 10 EDMs completed testing and reached sufficient technical maturity to support a Critical Design Review. At that point, DD(X) was programmed to consist of 10 highly automated, reduced signature, reduced manning electric drive ships. DD(X)'s major new systems included Dual Band Radar (DBR), and Advanced Guns System (AGS) with a Long Range Land Attack Projectile (LRLAP).
November 2005	The program achieved Milestone B. Major outstanding risks at Milestone B were related to the schedule and cost of software development and the integration and test of Mission Systems, as well as the costs of shipbuilder construction, DBR and AGS.
April 2006	The DD(X) program was renamed DDG 1000 and detail design contracts for the dual lead ships were awarded to BIW and Northrop Grumman Shipbuilding (NGSB) (formerly ISI).
December 2007	The ADM was issued authorizing the Navy to enter Production Phase for DDG 1000.
February 2008	The DoD approved Low Rate Initial Production for seven ships, and lead ship construction contracts were awarded to BIW and NGSB.
July 2008	The Navy provided testimony to the House Armed Services Committee Seapower and Expeditionary forces Subcommittee requesting Congressional support to truncate the DDG 1000 program and restart the DDG 51 program.
February 2010	The President's Budget (PB) FY 2011 budget submission confirmed the reduction of the DDG 1000 Program to three ships as a result of the Future Surface Combatant Radar Hull Study in which the Navy concluded a modified DDG 51 with an Advanced Missile Defense Radar was the most cost-effective solution to fleet air and missile defense requirements.
February 2010	The Secretary of the Navy notified Congress of a critical DDG 1000 program Nunn-McCurdy breach to the PAUC and APUC. This breach was due to the change in ship procurement quantity, not program performance.
June 2010	The USD (AT&L) certified a restructured three-ship program that included removal of the Volume Search Radar from the ship design, changed the IOC from FY 2015 to FY 2016, and revised test and evaluation requirements
October 2010	Milestone B prime was achieved for the restructured program following the Nunn-McCurdy

	certification.
March 2011	The APB for the restructured DDG 1000 Program was approved.
March 2013	Due to the FY 2013 sequestration impacts commencing during the execution year, the program experienced budget reductions of approximately $70.2M of Shipbuilding and Conversion, Navy (SCN) and $10.3M of RDT&E. The approximate $70.2M FY 2013 SCN sequester prevented the award of a $145M FY 2013 option to Raytheon for remaining Mission Systems Equipment (MSE) efforts for DDG 1000, 1001, and 1002, necessitating restructuring of the FY 2013, FY 2014, and FY 2015 options. A Below Threshold Reprograming for $9.999M of RDT&E was approved to continue LRLAP guided flight tests and combat systems development.
August 2013	The Navy awarded a contract modification for the design and construction of a steel deckhouse, hangar, and Aft Peripheral Vertical Launch System (PVLS) for DDG 1002 to BIW. The award occurred after the DDG 1002 sole source negotiation with HII for the procurement of the DDG 1002 composite deckhouse, composite hangar, and Aft PVLS did not reach an affordable solution and deliveries of these components for DDG 1002 were becoming time critical. The Navy concurrently pursued a steel deckhouse, hangar, and Aft PVLS using limited competition.
April 2014	DDG 1000 was christened at BIW in Bath, ME
December 2015	Raytheon was awarded a contract for remaining DDG 1002 MSE.
April 2016	DDG 1000 completed acceptance trials off the coast of Bath, ME.
May 2016	DDG 1000 delivered to the Navy (HM&E delivery)
June 2016	DDG 1001 was christened at BIW in Bath, ME. DDG 1001 floated off in Bath, ME.
September 2016	DDG 1000 sailed away from BIW en route to its homeport of San Diego.
October 2016	DDG 1000 was commissioned in Baltimore, MD.
November 2016	BAE was awarded the $192 million contract for post-delivery execution yard efforts to install combat systems, as well as to complete Post Shakedown Availabilities on DDG 1000 and DDG 1001. The work will be executed at BAE's San Diego, CA facility near the ships' homeport at Naval Station San Diego and will be overseen by NAVSEA.
December 2016	DDG 1000 arrived at its homeport of San Diego.
January 2017	DDG 1002 keel laid at the BIW facility in Bath, ME.
March 2017	DDG 1000 entered Post Shakedown Availability at the BAE shipyard in San Diego, CA.
November 2017	After a comprehensive review of Zumwalt class requirements, Navy decided in November 2017 to refocus the primary mission of the Zumwalt Class Destroyers from Land Attack to Offensive Surface Strike. The funding requested in PB 19 will facilitate this change in mission and add lethal, offensive fires against targets afloat and ashore. These changes include integration of SM-6 capability, Maritime Strike Tomahawk Integration, and organic cryptologic collection equipment (SPECTRAL). In order to maintain the required radar signature, an upgrade in off-board platform communications to the NTCDL is also required, paired with the SPECTRAL system.
December 2017	DDG 1001 started builder's trials off the coast of Bath, ME.

Threshold Breaches

APB Breaches		
Schedule		☑
Performance		☐
Cost	RDT&E	☐
	Procurement	☐
	MILCON	☐
	Acq O&M	☐
O&S Cost		☐
Unit Cost	PAUC	☐
	APUC	☐

Nunn-McCurdy Breaches		
Current UCR Baseline		
	PAUC	None
	APUC	None
Original UCR Baseline		
	PAUC	None
	APUC	None

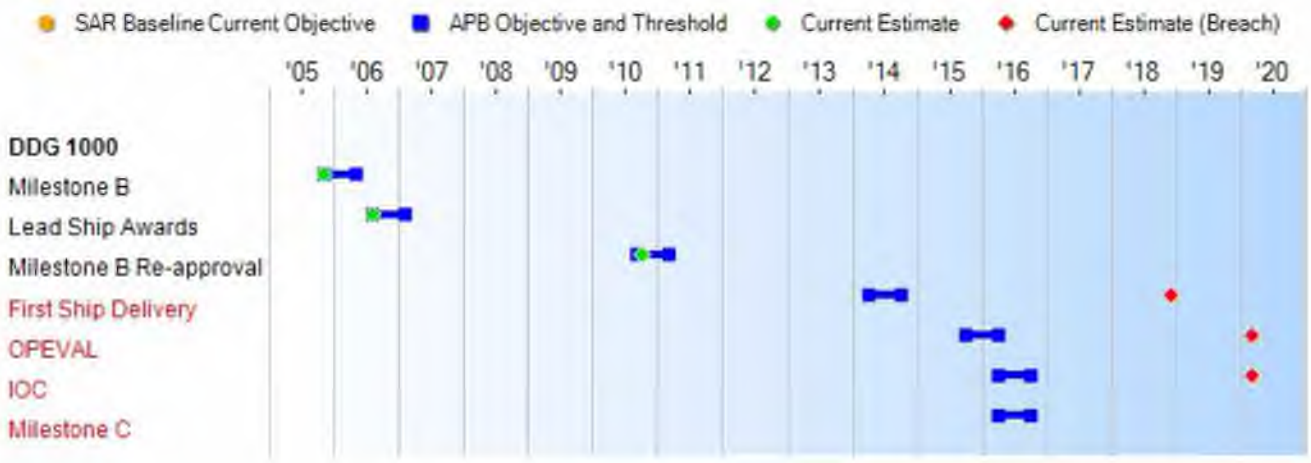
Explanation of Breach

A schedule breach was first reported in the December 2014 SAR and was due to technical risk, shipyard production and test challenges, and shipyard workforce constraints. The complexity of activation of the ship's unique Engineering Control System and Integrated Power System extended the time required for test and activation.

First ship Hull, Mechanical and Electrical (HM&E) delivery occurred in April 2016 marking completion of DDG 1000 at point of pre-mission systems activation. FY 2017 NDAA language included a provision that would require the Secretary of the Navy to deem ship delivery to occur at completion of the final phases of construction.

Current estimate for First Ship Final Delivery is December 2018. Operational Evaluation and IOC are being assessed in view of HM&E delivery delays.

Schedule



Schedule Events					
Events	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate	
Milestone B	Nov 2005	Nov 2005	May 2006	Nov 2005	
Lead Ship Awards	Jan 2006	Aug 2006	Feb 2007	Aug 2006	
Milestone B Re-approval	N/A	Sep 2010	Mar 2011	Oct 2010	
First Ship Delivery	Sep 2012	Apr 2014	Oct 2014	**Dec 2018**[1]	(Ch-1)
OPEVAL	Sep 2013	Oct 2015	Apr 2016	**Mar 2020**[1]	
IOC	Jan 2014	Apr 2016	Oct 2016	**Mar 2020**[1]	
Milestone C	Mar 2015	Apr 2016	Oct 2016	**N/A**[1]	

[1] *APB Breach*

Change Explanations

(Ch-1) DDG 1000 delivery changed from May 2018 to December 2018 due to increased Post Delivery Availability (PDA) scope and schedule delays in San Diego, CA.

Notes

First ship HM&E delivery occurred in May 2016 marking completion of DDG 1000 at point of pre-mission systems activation. FY 2017 NDAA language recommended a provision that would require the Secretary of the Navy to deem ship delivery to occur at completion of the final phases of construction.

Milestone C is not applicable since all three ships of the class are under contract and thus IOC is used as the Milestone C date.

DDG 1000 Final Delivery - Dec 2018

DDG 1001 Final Delivery - Sep 2020

DDG 1002 Final Delivery - Sep 2022

Acronyms and Abbreviations

HM&E - Hull, Mechanical, and Electrical
OPEVAL - Operational Evaluation

Performance

Performance Characteristics				
SAR Baseline Development Estimate	**Current APB Development Objective/Threshold**		**Demonstrated Performance**	**Current Estimate**
Number of Advanced Gun Systems				
2	2	2	TBD	2
Number of Advanced Vertical Launch Cells				
128	128	80	TBD	80
Total Ship Advanced Gun System Magazine Capacity				
1200 rounds (600 rounds per magazine)	1200 rounds (600 rounds per magazine)	600 rounds total ship magazine capacity	TBD	600 rounds (300 rounds per magazine)
Number of ship's company personnel (helicopter detachment included)				
125	125	175	TBD	175
Operational Availability (Ao) for mission critical systems:				
Ao for 120-day wartime profile				
0.95	0.95	0.90	TBD	0.95
Ao for 18 month extended forward deployment				
0.95	0.95	0.90	TBD	0.95
Interoperability: All top-level IERs will be satisfied to the standards specified in the Threshold and Objective values.				
Achieve 100% of top-level IERs. DD(X) joint tactical battle management and command and control computer programs shall conform to the SIAP System Engineer's Integrated Architecture and Integrated Architecture Behavior Model now being developed. DD(X) will remain in compliance with CJCSI 6212.01 (Series), Inter-operability and Support-ability of IT and NSS, including future updates.	Achieve 100% of top-level IER. DD(X) joint tactical battle management and command and control computer programs shall conform to the SIAP System Engineer's Integrated Architecture and Integrated Architecture Behavior Model now being developed. DD(X) will remain in compliance with CJCSI 6212.01 (Series), Inter-operability and Support-ability of Information Technology and National Security Systems (IT and NSS), including future updates.	Achieve 100% top-level IER designated as critical. DD(X) joint tactical battle mangage-ment and command and control computer programs shall conform to the SIAP System Engineer's Integrated Architecture and Integrated Archi-techture Behavior Model for Track Management now being developed. DD(X) will remain in compliance with CJCSI 6212.0 (Series), Inter-operability and Support-ability of Information Technology and National Security Systems (IT and NSS), Including future updates.	TBD	Achieve 100% of interfaces; services; policy-enforcement controls; and data correctness, availability and processing requirements designated as enterprise-level or critical in the Joint integrated architecture. This includes the ORD threshold requirements for meeting the IERs which are listed in DDG 1000 ORD Rev 15 (Table B) and the DDG 1000 TEMP Rev D (Table D-3).

Classified Performance information is provided in the classified annex to this submission.

Requirements Reference

DDX ORD Change 1 dated January 23, 2006

Change Explanations

None

Acronyms and Abbreviations

CJCSI - Chairman of the Joint Chiefs of Staff Instruction
IER - Information Exchange Requirement
IT - Information Technology
NSS - National Security System
Rev - Revision
SIAP - Single Integrated Air Picture
TEMP - Test and Evaluation Master Plan

Track to Budget

RDT&E

Appn		BA	PE		
Navy	1319	05	0204202N		
	Project		**Name**		
	2464		DDG 1000 System Design, Development and Integration		
	4009		Advanced Gun System on DDG 1000		(Sunk)
Navy	1319	04	0603513N		
	Project		**Name**		
	2465		DC Survivability	(Shared)	(Sunk)
	2467		Advanced Gun System	(Shared)	(Sunk)
	2468		Undersea Warfare	(Shared)	(Sunk)
	2469		Open System Architecture	(Shared)	(Sunk)
	2470		Integrated Topside Design	(Shared)	(Sunk)
	2471		Integrated Power System	(Shared)	(Sunk)
	4019		Radar Upgrades	(Shared)	(Sunk)
Navy	1319	05	0604300N		
	Project		**Name**		
	2463		DD(X) Construction	(Shared)	(Sunk)
	2464		DD(X) Sys Design, Dev & Integration	(Shared)	(Sunk)
	2465		DC Survivability	(Shared)	(Sunk)
	2466		MFR Development	(Shared)	(Sunk)
	2735		Volume Search Radar	(Shared)	(Sunk)
	4009		Advanced Gun System	(Shared)	(Sunk)
	4010		Integrated Power System on DD (X)	(Shared)	(Sunk)
Navy	1319	05	0604366N		
	Project		**Name**		
	0439		Standard Missile Improvement: DDG 1000	(Shared)	(Sunk)
Navy	1319	05	0604755N		
	Project		**Name**		
	2735		Volume Search Radar		(Sunk)

Procurement

Appn		BA	PE	
Navy	1611	02	0204202N	
	Line Item		**Name**	
	2119		DDG 1000	
Navy	1611	02	0204228N	
	Line Item		**Name**	
	2119		DDG 1000	(Sunk)
Navy	1611	02	0204222N	

	Line Item		Name	
	2119		DDG 1000	(Sunk)
Navy	1611	02	0702898N	
	Line Item		**Name**	
	2119		Management Headquarters	
Navy	1611	05	0204222N	
	Line Item		**Name**	
	5110		Outfitting	(Shared)
	5300		Destroyers - Missile	(Sunk)
Navy	1810	01	0204202N	
	Line Item		**Name**	
	0947		DDG 1000 Class Support Equipment	

Cost and Funding

Cost Summary

Total Acquisition Cost							
Appropriation	BY 2005 $M			BY 2005 $M	TY $M		
	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate	SAR Baseline Development Estimate	Current APB Development Objective	Current Estimate
RDT&E	8313.2	8994.0	9893.4	9309.0	8483.0	9325.5	9792.4
Procurement	23234.7	10195.3	11214.8	10611.8	27813.3	12497.8	13700.1
Flyaway	--	--	--	10611.8	--	--	13700.1
Recurring	--	--	--	9451.7	--	--	12344.8
Non Recurring	--	--	--	1160.1	--	--	1355.3
Support	--	--	--	0.0	--	--	0.0
Other Support	--	--	--	0.0	--	--	0.0
Initial Spares	--	--	--	0.0	--	--	0.0
MILCON	0.0	0.0	--	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	--	0.0	0.0	0.0	0.0
Total	31547.9	19189.3	N/A	19920.8	36296.3	21823.3	23492.5

Cost Notes

In accordance with Section 842 of the National Defense Authorization Act for FY 2017, which amended title 10 U.S.C. § 2334, the Director of Cost Assessment and Program Evaluation, and the Secretary of the military department concerned or the head of the Defense Agency concerned, must issue guidance requiring a discussion of risk, the potential impacts of risk on program costs, and approaches to mitigate risk in cost estimates for MDAPs and major subprograms. The information required by the guidance is to be reported in each SAR. This guidance is not yet available; therefore, the information on cost risk is not contained in this SAR.

Total Quantity			
Quantity	SAR Baseline Development Estimate	Current APB Development	Current Estimate
RDT&E	0	0	0
Procurement	10	3	3
Total	10	3	3

Cost and Funding

Funding Summary

Appropriation Summary									
FY 2019 President's Budget / December 2017 SAR (TY$ M)									
Appropriation	Prior	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	To Complete	Total
RDT&E	9119.3	140.5	161.3	132.3	133.8	88.6	16.6	0.0	9792.4
Procurement	12738.9	267.5	437.8	85.0	53.3	57.3	60.3	0.0	13700.1
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2019 Total	21858.2	408.0	599.1	217.3	187.1	145.9	76.9	0.0	23492.5
PB 2018 Total	21858.6	408.0	379.7	82.8	41.5	43.4	0.0	0.0	22814.0
Delta	-0.4	0.0	219.4	134.5	145.6	102.5	76.9	0.0	678.5

Quantity Summary										
FY 2019 President's Budget / December 2017 SAR (TY$ M)										
Quantity	Undistributed	Prior	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	To Complete	Total
Development	0	0	0	0	0	0	0	0	0	0
Production	0	3	0	0	0	0	0	0	0	3
PB 2019 Total	0	3	0	0	0	0	0	0	0	3
PB 2018 Total	0	3	0	0	0	0	0	0	0	3
Delta	0	0	0	0	0	0	0	0	0	0

Cost and Funding

Annual Funding By Appropriation

Annual Funding 1319 | RDT&E | Research, Development, Test, and Evaluation, Navy							
Fiscal Year	Quantity	TY $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
1995	--	--	--	--	--	--	7.0
1996	--	--	--	--	--	--	10.0
1997	--	--	--	--	--	--	12.0
1998	--	--	--	--	--	--	53.5
1999	--	--	--	--	--	--	215.1
2000	--	--	--	--	--	--	281.2
2001	--	--	--	--	--	--	532.4
2002	--	--	--	--	--	--	490.4
2003	--	--	--	--	--	--	895.4
2004	--	--	--	--	--	--	1002.2
2005	--	--	--	--	--	--	1120.2
2006	--	--	--	--	--	--	1040.6
2007	--	--	--	--	--	--	755.8
2008	--	--	--	--	--	--	516.5
2009	--	--	--	--	--	--	431.2
2010	--	--	--	--	--	--	503.8
2011	--	--	--	--	--	--	347.9
2012	--	--	--	--	--	--	249.8
2013	--	--	--	--	--	--	120.8
2014	--	--	--	--	--	--	189.6
2015	--	--	--	--	--	--	197.0
2016	--	--	--	--	--	--	101.7
2017	--	--	--	--	--	--	45.2
2018	--	--	--	--	--	--	140.5
2019	--	--	--	--	--	--	161.3
2020	--	--	--	--	--	--	132.3
2021	--	--	--	--	--	--	133.8
2022	--	--	--	--	--	--	88.6
2023	--	--	--	--	--	--	16.6
Subtotal	--	--	--	--	--	--	9792.4

Annual Funding 1319 | RDT&E | Research, Development, Test, and Evaluation, Navy							
Fiscal Year	Quantity	BY 2005 $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
1995	--	--	--	--	--	--	8.0
1996	--	--	--	--	--	--	11.3
1997	--	--	--	--	--	--	13.4
1998	--	--	--	--	--	--	59.1
1999	--	--	--	--	--	--	234.8
2000	--	--	--	--	--	--	302.6
2001	--	--	--	--	--	--	565.1
2002	--	--	--	--	--	--	515.3
2003	--	--	--	--	--	--	927.3
2004	--	--	--	--	--	--	1009.8
2005	--	--	--	--	--	--	1099.7
2006	--	--	--	--	--	--	990.7
2007	--	--	--	--	--	--	702.4
2008	--	--	--	--	--	--	471.4
2009	--	--	--	--	--	--	388.5
2010	--	--	--	--	--	--	447.2
2011	--	--	--	--	--	--	301.6
2012	--	--	--	--	--	--	213.1
2013	--	--	--	--	--	--	102.0
2014	--	--	--	--	--	--	157.8
2015	--	--	--	--	--	--	162.0
2016	--	--	--	--	--	--	82.2
2017	--	--	--	--	--	--	35.9
2018	--	--	--	--	--	--	109.8
2019	--	--	--	--	--	--	123.8
2020	--	--	--	--	--	--	99.6
2021	--	--	--	--	--	--	98.7
2022	--	--	--	--	--	--	64.1
2023	--	--	--	--	--	--	11.8
Subtotal	--	--	--	--	--	--	9309.0

Annual Funding 1611 | Procurement | Shipbuilding and Conversion, Navy							
Fiscal Year	Quantity	TY $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2005	--	--	--	304.0	304.0	--	304.0
2006	--	--	--	706.2	706.2	--	706.2
2007	2	2587.6	--	--	2587.6	--	2587.6
2008	--	3009.9	--	149.8	3159.7	--	3159.7
2009	1	1504.3	--	--	1504.3	--	1504.3
2010	--	1378.5	--	--	1378.5	--	1378.5
2011	--	247.1	--	--	247.1	--	247.1
2012	--	512.6	--	--	512.6	--	512.6
2013	--	682.4	--	--	682.4	--	682.4
2014	--	312.5	--	--	312.5	--	312.5
2015	--	521.8	--	--	521.8	--	521.8
2016	--	479.0	--	--	479.0	--	479.0
2017	--	309.8	--	--	309.8	--	309.8
2018	--	267.5	--	--	267.5	--	267.5
2019	--	348.1	--	--	348.1	--	348.1
2020	--	73.7	--	--	73.7	--	73.7
2021	--	38.5	--	--	38.5	--	38.5
2022	--	32.8	--	--	32.8	--	32.8
2023	--	38.7	--	--	38.7	--	38.7
Subtotal	3	12344.8	--	1160.0	13504.8	--	13504.8

Annual Funding 1611 | Procurement | Shipbuilding and Conversion, Navy							
Fiscal Year	Quantity	BY 2005 $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2005	--	--	--	275.1	275.1	--	275.1
2006	--	--	--	617.3	617.3	--	617.3
2007	2	2162.4	--	--	2162.4	--	2162.4
2008	--	2432.5	--	121.0	2553.5	--	2553.5
2009	1	1179.6	--	--	1179.6	--	1179.6
2010	--	1044.7	--	--	1044.7	--	1044.7
2011	--	181.5	--	--	181.5	--	181.5
2012	--	368.4	--	--	368.4	--	368.4
2013	--	481.4	--	--	481.4	--	481.4
2014	--	216.7	--	--	216.7	--	216.7
2015	--	355.5	--	--	355.5	--	355.5
2016	--	320.7	--	--	320.7	--	320.7
2017	--	203.8	--	--	203.8	--	203.8
2018	--	172.7	--	--	172.7	--	172.7
2019	--	220.4	--	--	220.4	--	220.4
2020	--	45.8	--	--	45.8	--	45.8
2021	--	23.4	--	--	23.4	--	23.4
2022	--	19.6	--	--	19.6	--	19.6
2023	--	22.6	--	--	22.6	--	22.6
Subtotal	3	9451.7	--	1013.4	10465.1	--	10465.1

Cost Quantity Information 1611 | Procurement | Shipbuilding and Conversion, Navy		
Fiscal Year	**Quantity**	**End Item Recurring Flyaway (Aligned With Quantity) BY 2005 $M**
2005	--	--
2006	--	--
2007	2	6657.7
2008	--	--
2009	1	2794.0
2010	--	--
2011	--	--
2012	--	--
2013	--	--
2014	--	--
2015	--	--
2016	--	--
2017	--	--
2018	--	--
2019	--	--
2020	--	--
2021	--	--
2022	--	--
2023	--	--
Subtotal	3	9451.7

Annual Funding 1810 | Procurement | Other Procurement, Navy							
Fiscal Year	Quantity	TY $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2017	--	--	--	33.4	33.4	--	33.4
2018	--	--	--	--	--	--	--
2019	--	--	--	89.7	89.7	--	89.7
2020	--	--	--	11.3	11.3	--	11.3
2021	--	--	--	14.8	14.8	--	14.8
2022	--	--	--	24.5	24.5	--	24.5
2023	--	--	--	21.6	21.6	--	21.6
Subtotal	--	--	--	195.3	195.3	--	195.3

Annual Funding 1810 | Procurement | Other Procurement, Navy							
Fiscal Year	Quantity	BY 2005 $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2017	--	--	--	26.4	26.4	--	26.4
2018	--	--	--	--	--	--	--
2019	--	--	--	68.3	68.3	--	68.3
2020	--	--	--	8.4	8.4	--	8.4
2021	--	--	--	10.8	10.8	--	10.8
2022	--	--	--	17.6	17.6	--	17.6
2023	--	--	--	15.2	15.2	--	15.2
Subtotal	--	--	--	146.7	146.7	--	146.7

Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	11/22/2005	10/8/2010
Approved Quantity	8	3
Reference	Milestone B ADM	Milestone B ADM
Start Year	2007	2007
End Year	2014	2009

The Current Total LRIP Quantity is more than 10% of the total production quantity due to the revised Milestone B ADM of October 8, 2010 reducing the LRIP quantity to three ships, which represents the total quantity remaining on the program.

Foreign Military Sales

None

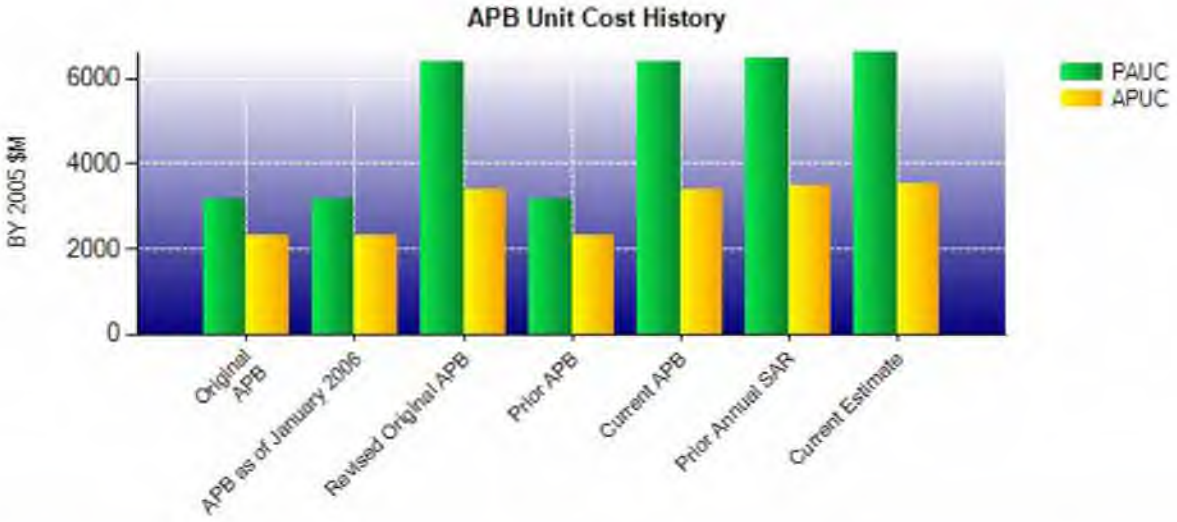
Nuclear Costs

None

Unit Cost

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2005 $M Current UCR Baseline (Mar 2011 APB)	BY 2005 $M Current Estimate (Dec 2017 SAR)	% Change
Program Acquisition Unit Cost			
Cost	19189.3	19920.8	
Quantity	3	3	
Unit Cost	6396.433	6640.267	+3.81
Average Procurement Unit Cost			
Cost	10195.3	10611.8	
Quantity	3	3	
Unit Cost	3398.433	3537.267	+4.09

Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2005 $M Revised Original UCR Baseline (Mar 2011 APB)	BY 2005 $M Current Estimate (Dec 2017 SAR)	% Change
Program Acquisition Unit Cost			
Cost	19189.3	19920.8	
Quantity	3	3	
Unit Cost	6396.433	6640.267	+3.81
Average Procurement Unit Cost			
Cost	10195.3	10611.8	
Quantity	3	3	
Unit Cost	3398.433	3537.267	+4.09



APB Unit Cost History					
Item	Date	BY 2005 $M		TY $M	
		PAUC	APUC	PAUC	APUC
Original APB	Nov 2005	3154.790	2323.470	3629.620	2781.320
APB as of January 2006	Nov 2005	3154.790	2323.470	3629.620	2781.320
Revised Original APB	Mar 2011	6396.433	3398.433	7274.433	4165.933
Prior APB	Nov 2005	3154.790	2323.470	3629.620	2781.320
Current APB	Mar 2011	6396.433	3398.433	7274.433	4165.933
Prior Annual SAR	Dec 2016	6475.900	3471.067	7604.667	4472.467
Current Estimate	Dec 2017	6640.267	3537.267	7830.833	4566.700

SAR Unit Cost History

Current SAR Baseline to Current Estimate (TY $M)									
PAUC Development Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
3629.630	603.400	2104.836	38.100	184.067	1270.800	0.000	0.000	4201.203	7830.833

Current SAR Baseline to Current Estimate (TY $M)									
Initial APUC Development Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
2781.330	601.000	125.470	37.167	-105.200	1126.933	0.000	0.000	1785.370	4566.700

SAR Baseline History				
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate
Milestone I	N/A	N/A	N/A	N/A
Milestone B	Nov 2005	Nov 2005	N/A	Nov 2005
Milestone C	Mar 2015	Mar 2015	N/A	N/A
IOC	Jan 2014	Jan 2014	N/A	Mar 2020
Total Cost (TY $M)	36296.2	36296.3	N/A	23492.5
Total Quantity	10	10	N/A	3
PAUC	3629.620	3629.630	N/A	7830.833

Cost Variance

Summary TY $M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Development Estimate)	8483.0	27813.3	--	36296.3
Previous Changes				
Economic	+8.8	+1819.0	--	+1827.8
Quantity	--	-19092.9	--	-19092.9
Schedule	+2.8	+111.5	--	+114.3
Engineering	+445.7	-379.5	--	+66.2
Estimating	+456.3	+3146.0	--	+3602.3
Other	--	--	--	--
Support	--	--	--	--
Subtotal	+913.6	-14395.9	--	-13482.3
Current Changes				
Economic	-1.6	-16.0	--	-17.6
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	+422.1	+63.9	--	+486.0
Estimating	-24.7	+234.8	--	+210.1
Other	--	--	--	--
Support	--	--	--	--
Subtotal	+395.8	+282.7	--	+678.5
Total Changes	+1309.4	-14113.2	--	-12803.8
Current Estimate	9792.4	13700.1	--	23492.5

Summary BY 2005 $M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Development Estimate)	8313.2	23234.7	--	31547.9
Previous Changes				
Economic	--	--	--	--
Quantity	--	-14646.0	--	-14646.0
Schedule	+1.7	+100.2	--	+101.9
Engineering	+385.3	-369.4	--	+15.9
Estimating	+314.3	+2093.7	--	+2408.0
Other	--	--	--	--
Support	--	--	--	--
Subtotal	+701.3	-12821.5	--	-12120.2
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	+313.3	+45.9	--	+359.2
Estimating	-18.8	+152.7	--	+133.9
Other	--	--	--	--
Support	--	--	--	--
Subtotal	+294.5	+198.6	--	+493.1
Total Changes	+995.8	-12622.9	--	-11627.1
Current Estimate	9309.0	10611.8	--	19920.8

Previous Estimate: December 2016

RDT&E	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-1.6
Additional funding for cyber security development and Surface Strike requirement. (Engineering)	+96.9	+131.1
Additional funding for Maritime Targeting Cell - Afloat requirement. (Engineering)	+216.4	+291.0
Revised estimate for Small Business Innovation Research adjustment. (Estimating)	-0.4	-0.4
Revised estimate due to Navy wide funding adjustments. (Estimating)	-16.3	-21.4
Revised estimate for inflation rate adjustments. (Estimating)	-2.8	-3.7
Adjustment for current and prior escalation. (Estimating)	+0.7	+0.8
RDT&E Subtotal	+294.5	+395.8

Procurement	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-16.0
Additional funding for new Surface Strike requirement. (Shipbuilding and Conversion, Navy (SCN)). (Engineering)	+45.9	+63.9
Revised estimate for DDG 1002 Mission System Activation (SCN). (Estimating)	+32.8	+51.8
Revised estimate for DDG 1002 Construction Completion (SCN). (Estimating)	+4.7	+7.4
Revised estimate for DDG 1001 Construction Completion (SCN). (Estimating)	+23.2	+36.7
Revised estimate for Program Support for Training (SCN). (Estimating)	+15.1	+24.0
Revised estimate for DDG 1002 SPY-3 Refurbishment (SCN). (Estimating)	+22.2	+35.0
Revised estimate for Department-wide funding adjustments (SCN). (Estimating)	-8.6	-14.1
Revised Post Delivery estimate to incorporate FY 2023 support (SCN). (Estimating)	+24.5	+41.7
Additional funding for Technical Data Center Refresh. (Other Procurement, Navy (OPN)). (Estimating)	+41.6	+54.7
Revised estimate to remove 2nd Data Center on DDG 1002 (OPN). (Estimating)	-12.2	-16.0
Revised estimate to reflect inflation rate funding adjustment (OPN). (Estimating)	-0.8	-1.2
Revised DDG 1000 Class Product Improvement to incorporate FY 2023 support (OPN). (Estimating)	+1.8	+2.5
Adjustment for current and prior escalation. (Estimating)	+8.4	+12.3
Procurement Subtotal	+198.6	+282.7

(U//FOUO) Contracts

(U//FOUO) Contract Identification	
Appropriation:	Procurement
Contract Name:	Phase IV BIW Construction (DDG 1001)
Contractor:	General Dynamics
Contractor Location:	700 Washington Street Bath, ME 04530
Contract Number:	N00024-11-C-2306/880
Contract Type:	Fixed Price Incentive (Successive Targets) (FPIS), Firm Fixed Price (FFP)
Award Date:	September 15, 2011
Definitization Date:	September 15, 2011

(b)(4)

(U//FOUO) Contract Identification

Appropriation:	Procurement
Contract Name:	Phase IV BIW Construction (DDG 1002)
Contractor:	General Dynamics
Contractor Location:	700 Washington Street Bath, ME 04530
Contract Number:	N00024-11-C-2306/881
Contract Type:	Fixed Price Incentive (Successive Targets) (FPIS), Firm Fixed Price (FFP)
Award Date:	September 15, 2011
Definitization Date:	September 15, 2011

(b)(4)

[redacted] Contract Identification

Appropriation:	Procurement
Contract Name:	Phase IV BIW Construction (DDG 1002 Steel Superstructure (Deckhouse))
Contractor:	General Dynamics
Contractor Location:	700 Washington Street Bath, ME 04530
Contract Number:	N00024-11-C-2306/882
Contract Type:	Fixed Price Incentive(Firm Target) (FPIF)
Award Date:	August 02, 2013
Definitization Date:	August 02, 2013

(b)(4)

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	0	--
Production	0	0	3	0.00%
Total Program Quantity Delivered	0	0	3	0.00%

Expended and Appropriated (TY $M)			
Total Acquisition Cost	23492.5	Years Appropriated	24
Expended to Date	21113.4	Percent Years Appropriated	82.76%
Percent Expended	89.87%	Appropriated to Date	22266.2
Total Funding Years	29	Percent Appropriated	94.78%

The above data is current as of February 12, 2018.

Operating and Support Cost

Cost Estimate Details

Date of Estimate:	June 02, 2015
Source of Estimate:	Service ICE
Quantity to Sustain:	3
Unit of Measure:	Ship
Service Life per Unit:	35.00 Years
Fiscal Years in Service:	FY 2016 - FY 2051

O&S cost estimates are based on the 2015 Gate 6 Review of DDG 1000 Class. Costs are shown in BY 2005 dollars. The estimate is based on an average unit cost of three ships with an average 35 year service life. The estimate includes separately priced mission system equipment sustainment cost. Mid-life modernization is not included.

The O&S costs are provided in revised cost elements based on the CAPE 2014 O&S Cost-Estimating Guide.

Sustainment Strategy

DDG 1000 maintenance is apportioned to either the ship or a land-based facility. There are two levels of maintenance planned for the DDG 1000 ship class: "on-ship" - accomplished by ship's force and "off-ship" - accomplished through maintenance support contracts in addition to the legacy Navy maintenance infrastructure. Maintenance support contracts similar to legacy Multi Ship/Multi Option contracting strategy for repairs and overhauls are planned. The DDG 1000 program provides Integrated Logistics Support oversight and guidance to Participating Acquisition Resource Managers that develop various sustainment approaches for combat systems and Communications, Command, Control, Computers, and Intelligence.

Antecedent Information

The Antecedent System is the DDG 51 ship class. The DDG 1000 and DDG 51 ships differ in various aspects that make comparison difficult. Considerations include new technologies, size difference, and an all electric ship design.

The 2017 unit cost of the DDG 51 (Antecedent) is derived using the Naval Visibility and Management of Operating and Support Costs database and is shown in BY 2005 $M. DDG 51 estimates are based on a service life of 35 years for the 28 Flight I and Flight II ships and 40 years for the 54 Flight IIA and Flight III ships. The DDG 51 costs shown in this SAR are identical to those in the DDG 51 December 2017 SAR converted into BY 2005 $M.

Annual O&S Costs BY2005 $M		
Cost Element	**DDG 1000 Average Annual Cost Per Ship**	**DDG 51 (Antecedent) Average Annual Cost Per Ship**
Unit-Level Manpower	12.776	10.042
Unit Operations	8.603	4.239
Maintenance	22.197	7.005
Sustaining Support	8.131	1.261
Continuing System Improvements	15.368	4.519
Indirect Support	6.623	6.529
Other	0.000	0.000
Total	73.698	33.595

Item	Total O&S Cost $M			
	DDG 1000			DDG 51 (Antecedent)
	Current Development APB Objective/Threshold		Current Estimate	
Base Year	7744.4	8518.8	7738.3	122957.5
Then Year	15245.3	N/A	14946.0	N/A

Disposal Cost is included in the Operating and Support Cost of the current APB objective and threshold for this program.

Equation to Translate Annual Cost to Total Cost

The equation that links the unitized cost to the total cost for DDG 1000 is Total Cost = average annual cost per ship * number of ships * service life = $73.7M per Ship x 3 Ships x 35 year (service life) = $7,738.3M (BY 2005)

O&S Cost Variance		
Category	**BY 2005 $M**	**Change Explanations**
Prior SAR Total O&S Estimates - Dec 2016 SAR	7738.3	
Programmatic/Planning Factors	0.0	
Cost Estimating Methodology	0.0	
Cost Data Update	0.0	
Labor Rate	0.0	
Energy Rate	0.0	
Technical Input	0.0	
Other	0.0	
Total Changes	0.0	
Current Estimate	7738.3	

Disposal Estimate Details

Date of Estimate: June 02, 2015

Source of Estimate:	Service ICE
Disposal/Demilitarization Total Cost (BY 2005 $M):	Total costs for disposal of all Ship are 53.7

O&S Baseline data is from Milestone B recertification Program Life Cycle Cost Estimates.